DEPARTMENT OF TRANSPORTATION
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July 11, 2002

04-CC-680-38.5/40.1
04-006054
ACIM-680-1(054)N

Addendum No. 4

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in CONTRA COSTA COUNTY IN AND NEAR MARTINEZ FROM 0.5 KM SOUTH OF MOCOCO OVERHEAD TO BENICIA-MARTINEZ BRIDGE AND OVERHEAD.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on July 16, 2002.

This addendum is being issued to revise the Project Plans, the Notice to Contractors and Special Provisions, and the Proposal and Contract

On Project Plan Sheet 258 under "QUANTITIES" the following item is added:

"MISCELLANEOUS METAL (BRIDGE) 1100 kg"

On Project Plan Sheet 364, in the "ISOLATOR BEARING PERFORMANCE CRITERIA TABLE," the value for "MAXIMUM THERMAL LATERAL FORCE" is revised to 110 KN.

On Project Plan Sheet 364, under "NOTES", $K_{eff} = F/\Delta$ is revised to $K_{eff}=F/D_T$.

On Project Plan Sheet 406, the item description "FRACTURED FIN TEXTURE," is revised to "FRACTURED RIB TEXTURE".

In the Special Provisions, Section 10-1.40, "LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE)," in the thirteenth paragraph, the following sentence is added at the beginning of the paragraph:

"On Waterfront Road, an existing water valve shall be protected during excavation for and placement of lightweight embankment material (cellular concrete) as shown on the plans."

In the Special Provisions, Section 10-1.40, "LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE)," the sixteenth paragraph is revised as follows:

"Full compensation for protecting water valve on Waterfront Road, shall be considered as included in the contract price paid per cubic meter for lightweight embankment material (cellular concrete, 6.3 kN/m3) and no separate payment will be made therefore."

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In the Special Provisions, Section 10-1.63, "SEISMIC ISOLATION BEARINGS," is revised as attached.

In the Special Provisions, Section 10-1.91, "CONCRETE BARRIER," the third paragraph is revised as follows:

"Bar reinforcing steel for use in concrete barriers shall be epoxy-coated and shall conform to the following provisions:"

In the Special Provisions, Section 10-1.91, "CONCRETE BARRIER," the fourth paragraph is deleted.

In the Special Provisions, Section 10-1.91, "CONCRETE BARRIER," in the fourth paragraph, after Provision "N.", the following Provisions "B." and "C." are deleted.

In the Proposal and Contract, the Engineer's Estimate Items 64, 65, 151, 152, and 186 are revised as attached.

To Proposal and Contract book holders:

Replace pages 6, 10 and 12 of the Engineer's Estimate in the Proposal with the attached revised pages 6, p10 and 12 of the Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the proposal.

Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This office is sending this addendum by confirmed facsimile to all book holders to ensure that each receives it.

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL, Chief
Office of Plans, Specifications & Estimates
Office Engineer

Attachments

10-1.63. SEISMIC ISOLATION BEARINGS

Seismic isolation bearings shall consist of a lead core rubber bearing system, which shall include top and bottom mounting plates, and anchorage components, and shall be designed, prototype tested, fabricated, proof tested and constructed as shown on the approved working drawings, as shown on the plans and as specified in these special provisions. Anchorage components shall include all studies and plates required for installation of isolation bearings.

The Contractor shall furnish, test, and install the number of seismic isolation bearings shown on the plans. All the seismic isolation bearings used in the work shall be of the same bearing system style, from the same manufacturer.

A qualified representative of the manufacturer shall be present during installation of all seismic isolation bearings.

Use of a seismic isolation bearing system is contingent on approval of working drawing submittal and successful performance of the seismic isolation bearings under testing. Development and approval of working drawings and testing will be at the Contractor's expense.

Only those manufacturers which are listed in these special provisions will meet the prequalification requirements specified herein.

The Lead Core Rubber Bearings system is an elastomeric bearing system with lead core consisting of alternate layers of rubber and steel plates vulcanized together with a preformed hole at the center of the unit filled tight with a lead plug.

The Lead Core Rubber Bearings system shall be selected from the following list:

SEISMIC ISOLATION BEARING SYSTEMS	MANUFACTURER ADDRESS AND PHONE NUMBER
Lead Core Rubber	DYNAMIC ISOLATION SYSTEMS, INC. 3470 MT. DIABLO BLVD, SUITE A200 LAFAYETTE, CA 94549 Ph: (510) 283-1166 Fax: (510) 283-4307 SEISMIC ENERGY PRODUCTS, L.P. 2447 Santa Clara Avenue, Suite 301 Alameda, CA 94501 Ph: (510) 749-1320 Fax: (510) 749-1363

ALTERNATIVE SEISMIC ISOLATION BEARING.--At the Contractor's option, an alternative seismic isolation bearing may be furnished and installed provided (1) that the quality of the alternative and its suitability for the intended application are at least equal to the manufacturers listed in these special provisions, (2) that acceptable working drawings and supplemental calculations are furnished as specified herein, (3) that successful performance of the alternative seismic isolation bearings under testing is achieved, and (4) that the alternative conforms to the following requirements:

The determination as to the quality and suitability of a seismic isolation bearing will be made in the same manner as provided in Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications.

The manufacturer of the seismic isolation bearing shall submit verification that they have met the following qualifications prior to the advertising date on the alternative seismic isolation bearing system submitted for consideration:

1 Be a participant in a seismic isolation bearing testing program approved by the California Department of Transportation for that seismic isolation bearing system. The testing program shall be performed in accordance with "A Test Plan for the Characterization and Qualification of Highway Bridge Seismic Isolator and Damping Devices" dated February 23, 1995

2 Provide proof that the alternative seismic isolation bearing system has had at least one year of satisfactory in-situ service for three major structures.

A copy of "A Test Plan for the Characterization and Qualification of Highway Bridge Seismic Isolator and Damping Devices" is included in the "Materials Information" available to the Contractor as provided in Section 2-1.03, “Examination of plans, Specifications, Contract, and Site of Work,” of the Standard Specifications.

Use of an alternative seismic isolation bearing system is contingent on an approval of the written request for substitution of an alternative isolation bearing system, approval of Parts 1 and 2 of the working drawings and supplements for each bearing type required on this contract, and the successful completion of the prototype and proof testing of the bearings. The complete written request for substitution shall include the type of seismic isolation bearing system, the name of the seismic isolation bearing manufacturer, verification that the qualifications specified above have been met by the manufacturer for the alternative seismic isolation bearing system, proposed changes to the "Time Limits" under Parts 1 and 2 of the "Working Drawings" below in order to conform to the required working day schedule, and a copy of the manufacturer's list of materials and standards used to manufacture the alternative seismic isolation bearings.

The Contractor shall submit the complete written request for the substitution of an alternative isolation bearing to the Engineer within 35 days after the contract award date. The Contractor shall allow 2 weeks after the complete written request for substitution and all complete data are submitted for the review of the request.

There will be no compensation and no extension of contract time allowed for the approval process to permit use of any proposed alternative.

No alternative shall be installed until the Engineer has determined that no aspect of the design will be compromised by the use of such alternative and has approved, in writing, the working drawing submittal for such alternative.

WORKING DRAWINGS.--The Contractor shall submit complete working drawings for the seismic isolation bearings to the Office of Structure Design, Documents Unit, P.O. Box 942874, MS #9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), Phone (916) 227-8230 in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 6 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to said Office for final approval and use during construction.

Working drawings and calculation sheet**s** shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. The manufacturer's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The working drawings shall contain all information required for the proper manufacture and installation of the seismic isolation bearings. The working drawings shall be supplemented with a quality control program and with a certified copy of the results of all prototype tests performed on the bearings. The working drawings shall be supplemented with a fully defined performance hysteresis loop and calculations for the particular bearing type installation for the bearing design. Each working drawing or calculation sheet shall be signed by an Engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall submit, with the working drawings, written maintenance and part replacement plans for approval. Maintenance and part replacement plans shall be submitted for each type of bearing. The maintenance plans shall include a list of all parts to be inspected, a regular inspection schedule, acceptable damage or wear tolerances of parts, and methods for measuring wear or damage. The part replacement plans shall include procedures for replacing worn out or damaged parts.

Approval by the Engineer of the seismic isolation bearing working drawings or seismic isolation bearing inspection will in no way relieve the Contractor of full responsibility for the seismic isolation bearings.

The working drawings and supplements for the isolation bearing shall be submitted in 2 parts. The working drawings and supplements shall be submitted within the following time limits:

ITEMS	TIME LIMIT
PART 1: Working drawings, including maintenance plan, proposed fully defined hysteresis loop, supplemental design calculations for each bearing type, supplemental commentary, as required, lateral stiffness under non-seismic lateral loads, initial vertical displacement under service loads, long-term vertical displacement under service loads, proof of 1 year satisfactory bearing system service at 3 major structures, and quality control program.	Within 4 weeks after contract approval.
PART 2: Fabrication and testing of two full-size prototype bearings for each bearing type, based on the approved working drawings. Following successful prototype testing, a certified copy of the results of all prototype tests.	Within 11 weeks following approval of the seismic isolation bearing design and working drawings, and sufficiently in advance of the start of the work to allow time for review by the Engineer and correction by the Contractor of the working drawings and supplements without delaying the work.

Inspection and Maintenance Manuals—The Contractor shall submit 6 inspection and maintenance manuals for the isolators for the Engineers review and approval prior to the completion of the project. The inspection and maintenance manuals shall include, but not be limited to, the following:

- Inspection requirements for the isolation bearings, including the recommended frequency of inspection. The manual shall include the specific observations to be made, and the acceptable range of values.
- Maintenance requirements for the bearings, including the recommended frequency of maintenance.
- Contact and telephone number for maintenance questions.

The Contractor shall allow 5 weeks following the complete submittal of Part 1 for the Engineer's review and approval of the working drawings and supplements. The Contractor shall not start fabrication of prototype test specimens until the Engineer has reviewed and approved the submittal of Part 1. The Contractor shall allow 3 weeks following the complete submittal of Part 2 for the Engineer's review and approval of the prototype test results. The Contractor shall not start proof testing until the Engineer has reviewed and approved the submittal of Part 2

Working drawings and supplemental calculations and commentary for the seismic isolation bearing system shall contain all information required for the quality control and manufacture and installation of the seismic isolation bearings, excluding proprietary information.

Working drawings shall include, but not limited to, the following:

1. Information on space requirements for installation equipment
2. Step-by-step procedure describing all aspects of seismic isolation bearing installation including materials, personnel, testing, and equipment. Installation procedure and materials specified for use in the seismic isolation bearing systems shall conform to the requirements in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications and these special provisions. When the Standard Specifications are not fully applicable, the section(s) shall be cited and the exceptions noted on the working drawings. If no applicable Standard Specification is available, ASTM or other industry standard specifications shall be referenced.

3. Full details of the seismic isolation bearing system, including material properties and dimensions of all bearing components.
4. Details for attaching the bearing system to the substructure, including masonry plate, anchor studs, and leveling procedure.
5. Details for attaching the bearing system to the superstructure.
6. Welding procedures and weld ability analysis for all welded materials.
7. Non-shrink grout mix designs when applicable.
8. Details of the seismic isolation bearing system testing apparatus.
9. Details and procedures involved in prototype and proof testing of seismic isolation bearing systems.
10. Information on the initial vertical displacement and long-term vertical displacement under anticipated service loading, and design lateral displacement due to seismic loading.
11. If applicable, a complete list of the components that will be permanently deformed during prototype or proof testing with calculations showing the anticipated stress and displacement in the components at each increment of the maximum seismic design lateral displacement.
12. If applicable, a complete list of energy dissipaters or other components damaged as a result of prototype or proof tests to be replaced prior to final installation.

Supplemental calculations and commentary to the working drawings shall include, but not be limited to, the following:

1. Description of the proposed bearing shall include, but is not limited to, the anticipated energy dissipated per cycle (EDC) for each bearing, fully defined hysteresis loop for each bearing, initial bearing stiffness, bearing yield point, secondary bearing stiffness after yield, break-away and dynamic friction coefficients (if applicable), maximum design lateral displacement, maximum design lateral force transmitted through each bearing, period of vibration, and anticipated maximum downward seismic bearing loads.
2. Complete calculations related to the design of seismic isolation bearing attachment to the substructure.
3. Complete calculations related to the design of seismic isolation bearing attachment to the superstructure.

The Quality Control Program for the seismic isolation bearings shall be submitted as Part 1 of the "Working Drawings" and shall include description, details and procedures for the following:

1. Certificates of Compliance in accordance with Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all materials used in the seismic isolation bearings.
2. Schedule identifying the dates for submittal of working drawings and supplements (Part 1 and Part 2), delivery of prototype test bearings, prototype testing, delivery of production bearings for proof testing, delivery of production bearings to the Contractor's on-site storage facility, and installation of each bearing.
3. Methods and equipment for handling, storage, and delivery of each bearing.
4. Installation instructions and precautions, including methods for protection of bearings from heat and debris during installation, or other conditions that may affect the bearing performance.
5. Tolerances on bearing component dimensions, alignment, and allowable working stresses.
6. Tolerances on material properties including, but not limited to, break-away friction and dynamic friction coefficients (if applicable), yield point, modulus of elasticity and other properties related to bearing performance.

Within 3 weeks after final working drawing approval, one set of good quality full sized corrected reproducible vellum prints of all the working drawings prepared by the Contractor for the seismic isolation bearings shall be furnished to the Engineer.

Each shipment of seismic isolation bearings shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall include a statement that the seismic isolation bearings conform to the prequalified design and material requirements and were manufactured in accordance with the approved quality control program. The certificate shall include a copy of the test results of all the proof tests performed on the seismic isolation bearing and its materials.

The Contractor shall notify the Engineer, in writing, at least 14 days prior to start of the seismic isolation bearing fabrication or testing.

No seismic isolation bearing shall be installed until the Engineer has reviewed and approved, in writing, the working drawings, the prototype testing and the proof testing for the seismic isolation bearing system to be used.

Should the Engineer fail to review the complete working drawing submittal within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the working drawing submittal, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

DESIGN REQUIREMENTS

The isolation bearings shall comply with all the applicable provisions of the American Association of State Highway and Transportation Officials (AASHTO) "Guide Specifications for Seismic Isolation Design," June 1999. In case of any conflict between the AASHTO Guide Specifications and this document, the requirements of these special provisions shall take precedence.

The seismic isolation bearing system shall be designed by the Contractor to satisfy the seismic isolation bearing design criteria for the loading conditions, maximum lateral force and displacements, rotations, hysteretic behavior and performance criteria shown on the plans. The seismic isolation bearing design shall be confirmed by the certified prototype test results for the bearings. In addition, if the plans or these special provisions indicate limiting parameters for a bearing system, the bearings shall conform to those parameters.

The seismic isolation shall be capable of operating at an ambient temperature range of -5° C to 50° C. The seismic isolation bearings shall be designed to withstand any of the probable combinations of the following atmospheric elements:

Hail, smoke, ozone, rain, sleet, ice, fog, sunshine, sand, dust, and salt.
Lead core rubber bearing

The ratio of bonded area to lead plug area in plan shall be equal to or greater than 9.0 for seismic isolation bearings.

The minimum length, width, or diameter of the part of the seismic isolation bearings that consist of alternate layers of rubber and steel plates vulcanized together (bonded dimension) shall be both:

1. Greater than the height of the bearing
2. Greater than 1.5 times the maximum seismic lateral displacement shown on the plans.

The seismic isolation bearings shall have a minimum factor of safety of 3.0 against buckling under maximum dead plus live load at a lateral displacement of zero.

The seismic isolation bearings shall be stable at a lateral displacement equal to 1.1 times the maximum seismic lateral displacement shown on the plans under an axial load equal to 1.2 times the dead load plus 0.5 times the live load plus seismic overturning force shown on the plans.

A minimum overlap area (A_T) defined as the portion of the top bonded surface area overlapping the bottom bonded surface area when the bearing is displaced to the maximum lateral seismic displacement shown on the plans is required as follows:

1. For a compressive stress up to 6.90MPa due to dead plus live load on the full bonded surface area (i.e. in the undeformed position), AT must be greater than or equal to 25% of the full bonded surface area.
2. For a compressive stress greater than 6.90 MPa but not greater than 13.79 MPa due to dead plus live load on the full bonded surface area, AT shall be equal to or greater than 50% of the full bonded surface area.
3. Compressive stresses above 13.79 MPa under dead plus live load will not be permitted.

The shear strain of the elastomer in the bearings shall not exceed 175% at the maximum seismic lateral displacement (D_T) shown on the plans for seismic isolation bearings.

MATERIALS AND FABRICATION

Metal parts for the Lead core rubber bearing system shall conform to the provisions in "Miscellaneous Metal (Bridge)," elsewhere in these special provisions, except that galvanizing will not be required for top and bottom mounting plates. At the Contractor's option, steel may conform to the requirements of ASTM Designation: A 570 for steel laminates and ASTM Designation: A 572 for steel mounting plates, masonry plates, spacer plates, bevel plates, and shim plates.

The flatness of the contact surfaces of the various plates shall be controlled such that upon completion of the assembly, all plate interfaces shall have full bearing as specified in Section 55-3.05, "Flatness of Faying and Bearing Surfaces," of the Standard Specifications.

High strength cap bolts shall conform to the requirements of ASTM Designation: A 325, and shall be mechanically galvanized.

Anchor studs shall conform to the provisions in "Miscellaneous Metal (Bridge)" elsewhere in these special provisions.

The elastomeric portion of the bearings shall conform to the following requirements:

The alternate layers of rubber and steel plates vulcanized together shall conform to the provisions for steel-laminated elastomeric bearings in ASTM Designation: D 4014, Grade 3, and the following:

ELASTOMER PROPERTIES		
TEST	ASTM TEST	REQUIRE-MENT
Tensile strength, MPa, minimum	D 412	13.79
Elongation at Break (EB) (percent minimum)	D 412	500
Compression set, 22 hrs. at 70° C., percent, maximum	D 395 (Method B)	40
Ozone Resistance ozone partial pressure of 50 ± 5 MPa, specimen at 20% strain, 100 hrs at 38° C	Specimen – D 518A test – D 1149	No cracks visible with a 7X lens
Tear strength, Newton per mm, minimum	D 624 (Die C)	31.54

The elastomer in the elastomeric bearing shall be natural rubber, Type NR.

At the Contractor's option, a different elastomer may be used for the side cover provided it meets the requirements of these special provisions.

The nominal thickness for steel laminates shall be a minimum of 3 mm. Galvanizing of steel laminates will not be required.

The steel laminates shall be covered at the sides of the bearing with a minimum thickness of 13 mm of the same elastomer as specified for the elastomeric bearing. At the Contractor's option, ethylene propylene rubber (EPDM), with a minimum thickness of 13 mm and ozone resistance equal to that specified for the elastomer in the bearing, may be used as an elastomer cover.

Stacking of individually laminated pads or cold bonding of individual laminated pads will not be permitted.

The core shall consist of a minimum of 99 percent pure lead.

PROTOTYPE AND PROOF TESTING.--Prototype and proof test specimens of seismic isolation bearing systems shall be conditioned for 12 hours at 18°±3° C. prior to testing, and the ambient temperature shall be maintained at 18°±8° C. during testing.

Prototype and proof tested seismic isolation bearings shall be permanently marked on 2 of 4 sides. The markings shall consist of production lot number, date of fabrication, design dead plus live load, and contract number.

If applicable, components in any bearing system which are permanently deformed during prototype or proof testing shall be replaced with identical components prior to final installation, as approved by the Engineer.

Prototype Testing: A complete series of prototype tests shall be performed at the "Seismic Response Modification Device Test System (SRMD)" on the University of California, San Diego (UCSD) campus, telephone (619) 534-4640. All prototype testing will be paid for by the State, except for any re-testing due to rejection of a seismic isolation bearing. The Contractor shall notify the SRMD facility and the Engineer, in writhing, at least 21 days prior to shipment of seismic isolation bearings for prototype or proof testing. The contractor shall coordinate with the SRMD facility for the design and manufacturing of the adapter plates to be used to be attached the bearing to the test apparatus. After testing, all plates will become the property of the State. All prototype tests shall be performed using continuous sinusoidal input at the period as shown on the plans for each device, or at a period as determined by the Engineer, unless specified otherwise herein. The Contractor shall coordinate the testing with SRMD facility specifying the quantities of bearing needed to at pre-set times to meet the construction schedules. Testing will not be scheduled at the SRMD facility until after 6 months after the contract awarded. For each type of isolation bearing, the Contractor shall allow four week for the SRMD facility to perform the prototype testing. All testing shall be in the presence of the Engineer, unless otherwise directed, on at least one full-sized specimen for each bearing type designated in the Engineer's Estimate, for the performance criteria shown on the plans and as defined in the approved working drawings and supplements. A total of at least 2 full-sized prototype specimens shall be constructed. If the prototype test is to be performed on a single bearing set up, the specimen will be selected by the Engineer. Any prototype test bearings that fail any of the required tests shall be rejected. For each cycle of tests, the load, displacement, and hysteretic behavior of the prototype specimen shall be continuously recorded

A complete series of prototype tests shall be performed in each of 2 directions, as follows:

For a circular bearing, at 0 ° and 90 ° relative to the primary axis of the device.
For a square bearing, at 0 ° and 45 ° relative to the primary axis of the device.

All prototype tests, unless noted otherwise, shall be performed using continuous sinusoidal displacement or a constant velocity with peak velocity at the period of the superstructure shown on the plans.

The following prototype tests shall be performed in the sequence shown for the prescribed number of cycles, at 1.0 times the vertical dead load shown on the plans, unless otherwise specified:

Prototype Test 1. Three fully reversed cycles of load at lateral displacement corresponding to the thermal displacement (D_T) shown on the plans. The test velocity shall not be less than 0.25 mm per minute and shall not be greater than 12 mm/minute.

Prototype Test 2. Twenty fully reversed cycles between the limits of plus and minus the maximum non-seismic transverse lateral load (K_{tr}) shown on the plans, for a total duration not less than 40 seconds. After cyclic testing the design load shall be held for 1 minute.

Prototype Test 3. Three fully reversed cycles of loading at each of the following multiples of the maximum seismic bearing displacement (D_T) shown on the plans: 1.0, 0.25, 0.50, 0.75, 1.0 and 1.1, in this sequence.

Prototype Test 4. Ten fully reversed cycles of loading at 1.0 times the maximum seismic bearing displacement shown on the plans. The test shall be started from a displacement equal to the thermal displacement shown on the plans.

Prototype Test 5. Five fully reversed cycles between the limits of plus and minus the maximum non-seismic lateral displacement shown on the plans, for a total duration of not less than 10 seconds.

Prototype Test 6. Three fully reversed cycles of loading at the maximum seismic bearing displacement shown on the plans.

Prototype Test 7. Applied static vertical load of 3.0 times (DL + LL)at zero displacement, and maintain the vertical load for 1 minute.

Prototype Test 8. One fully reversed cycle of loading at 1.1 times the maximum seismic lateral displacement (D_T), at a vertical load combination of (1.2DL + 0.5LL + EQD), as shown on the plans.

A complete series of prototype tests shall satisfy the following conditions:

The load-displacement plots of all prototype tests shall have a positive incremental lateral stiffness.
The maximum lateral force in Prototype Test 1 shall be less than the maximum thermal lateral force shown on the plans.
The maximum lateral force in Prototype Test 2 shall be less than the maximum non-seismic lateral displacement.

At each displacement increment specified in Prototype Test 3, there shall be within ±15 percent change from the average value of effective stiffness (K_{eff}) of the given test specimen in each cycle. The energy dissipated per cycle (EDC), for each cycle, in Prototype Test 3 at 1.0 times the maximum seismic lateral displacement shown on the plans, shall be a minimum of 85 percent of the value of EDC shown on the plans. The average value of effective stiffness (K_{eff}) at 1.0 times the maximum seismic lateral displacement shown on the plans shall be less than 15 percent change from the value shown on the plans. The maximum lateral force at 1.0 times the maximum seismic bearing displacements shown on the plans shall not deviate more than 15% from the seismic lateral force (F) shown on the plans.

The energy dissipated per cycle (EDC), for each cycle, in Prototype Test 4 shall be a minimum of 85 percent of the value of EDC shown on the plans. The maximum lateral force shall be less than the maximum force (F) shown on the plans.

In Prototype Test 5, the maximum displacement shall not exceed the maximum non-seismic lateral displacement (Δ_{tr}) shown on the plans.

In Prototype Test 6, the measured EDC for each cycle shall be a minimum of 85 percent of the value of EDC shown on the plans. The maximum lateral force shall not exceed the seismic lateral force shown on the plans. The average K_{eff} shall be within ±15 percent change from the value shown on the plans.

Specimens for all prototype tests shall remain stable and without splits or fractures at all loading conditions.

If a seismic isolation bearing that is prototype tested fails to meet any of the acceptance criteria for testing as determined by the Engineer, said bearing will be rejected. If rejected, the Contractor shall modify the bearing design or manufacturing procedures and submit revised working drawings which include the modifications, and shall repeat the prototype tests on another seismic isolation bearing from the same system. The Contractor may abandon the seismic isolation bearing system and test another prototype from another seismic isolation bearing system. If another seismic isolation bearing system is selected, it shall meet the requirements described in the Section "Alternative Seismic Isolation Bearing" in these special provisions. Seismic isolation bearing prototype testing operations shall not begin until the Engineer has approved the revised working drawings in writing. No extension of time or compensation will be made for modifying working drawings or supplemental calculations, for resubmittal and review of working drawings and supplemental calculations, for rejection of a proposed seismic isolation bearing system, and designing and testing additional seismic isolation bearing systems.

Proof Testing: Prior to installation of any seismic isolation bearing, the seismic isolation bearing systems shall be proof tested and evaluated at an approved laboratory in the presence of the Engineer, unless otherwise directed.

All proof test, unless noted otherwise, shall be performed using continuos sinusoidal input or at a constant velocity with peak velocity of 25 mm/second.

Each production bearing shall have the same design and be manufactured in the same way as the prototype bearing which successfully passed the prototype testing and was accepted by the Engineer. The tests may be performed on individual bearings or on pairs of bearings of the same size, at the Contractor's option.

All seismic isolation bearings shall be proof tested as follows:

Proof compression test: A 5-minute sustained proof load test on each production bearing shall be required. The compressive load for the test shall be 1.5 times the sum of the dead load plus live load (DL+LL) shown on the plans. If bulging suggests poor laminate bond or the bearing demonstrates other signs of distress, the bearing will be rejected.

Proof combined compression and shear test: Three fully reversed cycles of loading at 1.0 times the maximum seismic bearing displacement (Δ_{max}) shown on the plans for each seismic isolation bearing. The compressive load for the test shall be 1.0 times the vertical dead load shown on the plans. The average effective stiffness (K_{eff}) of an individual bearing shall be within ±15 percent of the values shown on the plans for each seismic isolation bearing. The average EDC shall be a minimum of 85 percent of the design EDC shown on the plans. The maximum lateral force shall not exceed the seismic lateral force (F) shown on the plans.

If the bearing demonstrates signs of distress during the proof tests, the bearing will be rejected. Signs of distress include, but are not limited to, debonding of bearing liner from the steel surface, and any permanent structural deformation.

Proof test seismic isolation bearings shall remain stable and without splits, fractures or other unspecified distress at all loading conditions.

The seismic isolation bearing system shall satisfy all aspects of the prototype and proof tests.

Test Submittals.--At the completion of a prototype or proof test, the Contractor shall submit to the Engineer eight copies of the complete test results for the seismic isolation bearings tested. Data for each test shall list location of test, key personnel, test loading equipment, type of seismic isolation bearing, complete record of load, displacement, rotation, hysteretic behavior and period of load application for each cycle of test.

STORAGE AND HANDLING.--The bearings shall be furnished with suitable temporary assembly ties. The bearing manufacturer shall transport the bearings to and from the proof testing facility and provide interim storage of the production bearings until delivery is scheduled to the Contractor's on-site storage facility. The Contractor shall provide verification of placement of bearings in the storage facility to the Engineer at such time as each bearing or group of bearings is placed in the storage facility.

The Contractor shall provide an on-site storage facility for the bearings, and shall transport the bearings from the manufacturer's interim storage to the on-site storage facility. The Contractor shall handle and store the bearings in conformance with the requirements outlined by the manufacturer in the approved working drawing submittal.

INSTALLATION.--The seismic isolation bearings shall be installed as shown on the plans.

MEASUREMENT AND PAYMENT.-- Seismic isolation bearings will be measured and paid for by the unit as seismic isolation bearings of the types listed in the Engineer's Estimate. The quantity of seismic isolation bearings will be determined from actual count of the bearings in place in the completed work.

The quantities for alternative seismic isolation bearings will be computed on the basis of the dimensions and details for the types of seismic isolation bearings shown on the plans and payment will be made based on the quantities shown in the Engineers Estimate for said seismic isolation bearings. No change in the quantities to be paid for will be made because of the use by the Contractor of alternative seismic isolation bearings.

The contract unit price paid for seismic isolation bearings of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials (including sample bearings used for prototype testing), tools, equipment and incidentals, and for doing all the work involved in designing, and redesigning, if necessary, prototype and proof testing, fabricating, furnishing, and testing prototype bearings, fabricating, furnishing, proof testing and installing seismic isolation bearings, replacing rejected or damaged components, and installing the seismic isolation bearings with top and bottom mounting plates, masonry plates, spacer plates, bevel plates, and anchorage components, complete in place, including elastomeric bearing pads, neoprene pads, drilling and tapping for cap bolts, and non-shrink grouting, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No payment will be made for seismic isolation bearings which fail to meet any of the acceptance criteria.

Full compensation for revisions to other facilities, made necessary by the use of an alternative seismic isolation bearings shall be considered as included in the contract unit price paid for the seismic isolation bearings of the types shown on the plans and in the Engineer's Estimate and no separate payment will be made therefore.

Full compensation for system performance and proof testing alternative seismic isolation bearings shall be considered as included in the contract unit price paid for the seismic isolation bearings of the types shown on the plans and in the Engineer's Estimate and no additional compensation will be allowed therefore.

No payment will be made for alternative seismic isolation bearings which fail to meet any of the acceptance criteria.

No compensation will be made for additional excavation, backfill, concrete, reinforcement, and any other costs incurred from seat enlargement resulting from replacing rejected alternative seismic isolation bearings or for placing additional alternative seismic isolation bearings with seismic isolation bearings that failed to meet the specified testing requirements.

No change in the quantities of earthwork, concrete, and reinforcement to be paid for will be made because of the use by the Contractor of alternative seismic isolation bearings.

Full compensation for energy dissipaters (if applicable), replacement energy dissipaters if required, and revisions to the structure or other facilities made necessary by the use of a particular seismic isolation bearing system, shall be considered as included in the contract unit price paid for seismic isolation bearing of the types listed in the Engineer's Estimate and no separate payment will be made therefore.

Full compensation for cleaning and painting of the bearing, including top and bottom mounting plates, masonry plates, spacer plates, and bevel plates, as specified in these special provisions, shall be considered as included in the contract unit price paid for seismic isolation bearing of the types listed in the Engineer's Estimate and no separate payment will be made therefore.

Threaded bar anchor bolts will be paid for as miscellaneous metal (bridge).

If a portion or all of seismic isolation bearings are tested at a site more than 483 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. All testing shall be performed within the continental United States. Payment to the Contractor for seismic isolation bearings will be reduced $5,000 for each testing site located more than 483 air line kilometers from both Sacramento and Los Angeles, or in the case of each testing site located more than 4,828 air line kilometers from both Sacramento and Los Angeles, payment will be reduced $12,000.

ENGINEER'S ESTIMATE
04-006054

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61	023734	ROADWAY EXCAVATION (HAZARDOUS)	M3	270		
62	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM	LUMP SUM	
63 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	1675		
64 (F)	192023	STRUCTURE EXCAVATION (HAZARDOUS)	M3	204		
65 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	1490		
66 (F)	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	M3	160		
67 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	1444		
68 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	2371		
69	023735	STRUCTURE EXCAVATION (SIGN FOUNDATION)	M3	22		
70	023736	STRUCTURE BACKFILL (SIGN FOUNDATION)	M3	16		
71 (F)	193028	STRUCTURE BACKFILL (SOIL NAIL WALL)	M3	20		
72	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	M3	140		
73	193114	SAND BACKFILL	M3	11		
74	194001	DITCH EXCAVATION	M3	1080		
75	023737	DITCH EXCAVATION (HAZARDOUS)	M3	200		
76	023738	DRAINAGE EXCAVATION (HAZARDOUS)	M3	49		
77 (S)	197060	SOIL NAIL ASSEMBLY	M	830		
78	BLANK					
79	198200	SUBGRADE ENHANCEMENT FABRIC	M2	3290		
80	023740	GEOMEMBRANE (TYPE B)	M2	11 600		

ENGINEER'S ESTIMATE
04-006054

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
141 (S)	048982	SEISMIC ISOLATION BEARING	EA	22		
142 (S)	519117	JOINT SEAL (MR 30 MM)	M	97		
143 (S)	519129	JOINT SEAL ASSEMBLY (MR 101 MM - 160 MM)	M	30		
144 (S)	519130	JOINT SEAL ASSEMBLY (MR 161 MM - 240 MM)	M	41		
145 (S-F)	023754	BAR REINFORCING STEEL (SIGN FOUNDATION)	KG	669		
146 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	2 919 200		
147 (S-F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	168 743		
148 (S-F)	520120	HEADED BAR REINFORCEMENT	EA	38 000		
149 (F)	530100	SHOTCRETE	M3	26		
150 (S-F)	550101	STRUCTURAL STEEL	KG	89 300		
151 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	57 492		
152 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	57 492		
153 (S)	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	6.5		
154	023756	1524 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	7		
155	566011	ROADSIDE SIGN - ONE POST	EA	18		
156	566012	ROADSIDE SIGN - TWO POST	EA	2		
157	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	5		
158	BLANK					
159	620910	450 MM ALTERNATIVE PIPE CULVERT (TYPE A)	M	10		
160	620911	450 MM ALTERNATIVE PIPE CULVERT (TYPE B)	M	28		

ENGINEER'S ESTIMATE
04-006054

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
181	729010	ROCK SLOPE PROTECTION FABRIC	M2	33		
182	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	10		
183 (F)	731517	MINOR CONCRETE (GUTTER)	M	120		
184 (S-F)	750001	MISCELLANEOUS IRON AND STEEL	KG	2328		
185 (S-F)	750496	MISCELLANEOUS METAL (RESTRAINER - PIPE TYPE)	KG	2610		
186 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	KG	32 760		
187 (S-F)	800381	CHAIN LINK FENCE (TYPE CL-0.9)	M	120		
188 (S)	800382	CHAIN LINK FENCE (TYPE CL-0.9, VINYL-CLAD)	M	290		
189 (S)	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	340		
190	BLANK					
191 (S)	802592	2.4 M CHAIN LINK GATE (TYPE CL-1.8)	EA	2		
192	810116	SURVEY MONUMENT (TYPE D)	EA	10		
193	820134	OBJECT MARKER (TYPE P)	EA	5		
194	820151	OBJECT MARKER (TYPE L-1)	EA	20		
195 (S)	832003	METAL BEAM GUARD RAILING (WOOD POST)	M	320		
196	833080	CONCRETE BARRIER (TYPE K)	M	1800		
197 (S)	839565	TERMINAL SYSTEM (TYPE SRT)	EA	10		
198 (S)	839568	TERMINAL ANCHOR ASSEMBLY (TYPE SFT)	EA	3		
199 (S)	839591	CRASH CUSHION, SAND FILLED	EA	3		
200 (S)	839603	CRASH CUSHION (ADIEM)	EA	2		